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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/071,456	02/08/2002	David L. Dickerson	MI22-1943	9958
21567	7590	11/10/2004	EXAMINER	
WELLS ST. JOHN P.S. 601 W. FIRST AVENUE, SUITE 1300 SPOKANE, WA 99201			MAI, ANH D	
			ART UNIT	PAPER NUMBER
			2814	

DATE MAILED: 11/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/071,456

Applicant(s)

DICKERSON ET AL.

Examiner

Anh D. Mai

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 26 October 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 69-71 and 73-79 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 69-71 and 73-79 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 26, 2004 has been entered.

### ***Status of the Claims***

2. Amendment filed October 26, 2004 has been entered. Claim 76 has been amended. Claims 78 and 79 have been added. Claims 69-71 and 73-79 are pending.

### ***Specification***

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested:

SEMICONDUCTOR CONSTRUCTION HAVING POLYSILICON LAYER FORMED  
AGAINST TRENCHES FILLED WITH INSULATIVE MATERIAL.

### ***Claim Objections***

4. Claim 71 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the

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claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim 71 recites: the semiconductor construction of claim 69 wherein the insulative material comprises a first insulative material partially filling the trench and a second insulative material formed over the first insulative material.

However, claim 69, line 25, recites: **an entirety of the insulative material** comprising the same stoichiometry.

Since the first insulative material is the thermal liner and it is well known in the art that thermal oxide and CVD oxide does not have the same stoichiometry, therefore, claim 71 fails to further limit claim 71.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 69-71 and 73-79 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

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There does not appear to be a written description of the claim limitation “an entirety of the insulative material comprising **the same stoichiometry**” or “wherein the sidewalls form **right angles** with the bottom wall” in the application as filed.

Moreover, according to the specification, the insulative material filling the trench includes a thermally grown oxide liner and a CVD oxide.

It is well known that the stoichiometries of the thermally grown oxide liner and of the CVD oxide are different.

How can the **entirety** of the insulative material comprising the same stoichiometry since that insulative material has two structurally different materials ?

With respect to “the sidewalls form right angles with the bottom wall”, it appears that the Applicant have drawn these terms from the drawings. However, the drawings are not drawn to scale and the actual formation of the trench are clearly discloses by S. Wolf et al., Silicon Processing for the VLSI Era, Vol. 2, Lattice Press 1990, pp. 51-54.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 69-71 and 73-79 are rejected under 35 U.S.C. 102(e) as being anticipated by Tseng (U.S. Patent No. 5,801,082).

With respect to claim 69, as best understood by the examiner, Tseng teaches a semiconductor construction as claimed including:

a semiconductor substrate (10) having a trench (4) extending partially therein and upper surfaces adjacent the trench (4);

an oxide layer (26) formed over the upper surfaces of the semiconductor substrate (10) and having an uppermost surface;

an insulative material (22) filling the trench (4) and having a portion outward of the trench (4) and semiconductor substrate (10), the portion comprising an outermost upper surface elevationally above the uppermost surface of the oxide layer (26) and sidewalls connecting the outermost upper surface with the oxide layer (26), the sidewalls comprising first and second curved segments, the first curved segment extending from the outermost upper surface and comprising a first apex directed away from the semiconductor substrate (10), and the second curved segment extending from the first curved segment to the oxide layer (26) and comprising a second apex directed toward the semiconductor substrate (10), the second apex being elevationally at or above the upper most surface of the oxide layer (26), an entirety of the insulative material (22) comprising the same stoichiometry; and

a polysilicon layer (28) formed against the uppermost surface of the oxide layer (26) and against the portion of the insulative material (22). (See Fig. 8).

Since the silicon oxide 22 of Tseng is  $\text{SiO}_2$ , thus, same stoichiometry.

With respect to claim 70, the insulative material (22) of Tseng comprises oxide.

With respect to claim 71, the insulative material (22) of Tseng comprises a first insulative material (18) partially filling the trench and a second insulative material (22) formed over the first insulative material (18).

With respect to claim 73, the trench (4) of Tseng comprises sidewalls connected by a bottom wall, and wherein the first curved segments of the portion are elevationally above and between the sidewalls of the trench (4).

With respect to claim 74, the trench (4) of Tseng comprises sidewalls connected by a bottom wall, and the first curved segments of the portion are directly over the bottom wall of the trench.

With respect to claim 75, the trench (4) of Tseng comprises sidewalls intersecting the upper surfaces of the semiconductor substrate (10), the intersection being positioned elevationally directly below the second curved segment of the portion of the insulative material (22).

With respect to claim 76, as best understood by the examiner, the trench (4) of Tseng comprises sidewalls extending substantially perpendicular relative the upper surfaces of the semiconductor substrate.

With respect to claim 77, as best understood by the examiner, the trench (4) of Tseng comprises sidewalls connected by a bottom wall, and wherein the sidewalls form right angles with the bottom wall.

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With respect to claim 78, the polysilicon layer (28) of Tseng directly contact the sidewalls of the portion of the insulative material (22).

With respect to claim 78, the polysilicon layer (28) of Tseng directly contact the sidewalls and the outermost upper surface of the portion of the insulative material (22).

### ***Response to Arguments***

#### **Rejection Under 35 U.S.C. 112, first paragraph**

With respect to an entirety of the insulative material comprising the same stoichiometry, Applicants argue that Applicants have not defined the insulative material to be a thermal liner and the CVD oxide.

However, the term “**an entirety** of the insulative material comprising the same stoichiometry” means all materials that were used to fill the trench, which clearly includes the **thermal liner**.

Further, after reviewing the entire disclosure including the drawings, there is no evidence that the entirety of the insulative material comprising the same stoichiometry.

Applicant should direct this Examiner to the specific portion of the disclosure that is positively indicated the same stoichiometry of the trench fill materials.

With respect to the terms “substantially perpendicular”, Applicants state that the term substantially perpendicular is only a spatial relationship.



With respect to the term “form right angles with bottom wall”, Applicants argue that this term also recites a spatial relationship.

However, unlike “substantially perpendicular”, the term “form right angles with bottom wall” is very specific. A right angle is  $90^\circ$ , no more no less. As clearly shown in Wolf (previously cited) a trench formed by RIE is subject to polymer built up at the sidewalls, thus, the angles of the sidewall is  $\sim 87^\circ$  to vertical. Therefore, the term “form right angles with the bottom wall” requires a specific recitation in the specification.

7. Applicant's arguments with respect to all pending claims have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anh D. Mai whose telephone number is (571) 272-1710. The examiner can normally be reached on 9:00AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

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applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'Anh D. Mai', with a large, stylized flourish extending to the right.

Anh D. Mai  
November 5, 2004